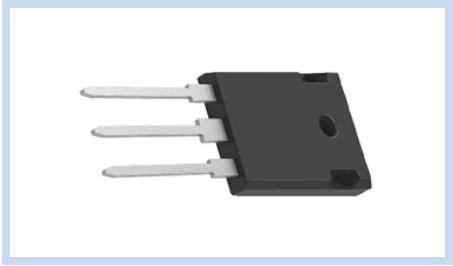
# Silicon Carbide MOSFET
# N-Channel 1700V 7A TO-247

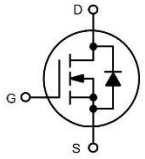
MFTC170N7T247

MERITEK

## FEATURE



- $R_{DS(ON)}$<850mΩ at $V_{GS}$=20V, $I_D$=2A
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed Switching
- Ultra-low Drain-Gate Capacitance
- Easy to Parallel and Simple to Drive
- Applications: Auxiliary Power Supplies, Switching Mode Power Supplier




RoHS

## MECHANICAL DATA

- Case: TO-247 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

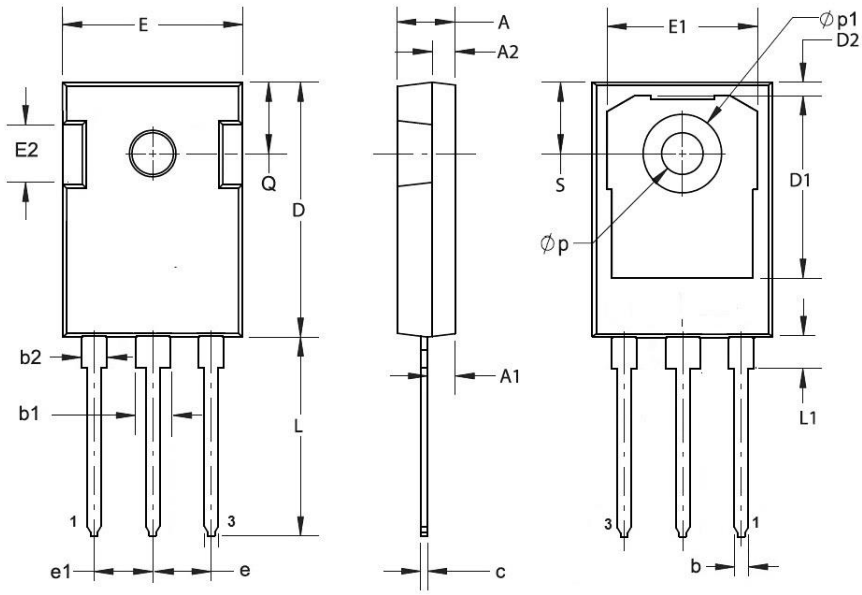
## MAXIMUM RATINGS

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | $V_{GS}$=0V, $I_D$=100μA | $V_{DS}$ | 1700 | V |
| Gate-Source Voltage | Absolute Maximum Value | $V_{GS}$ | -10/+25 | V |
| | Recommended Operational Values | | -5/+20 | |
| Drain Current – Continuous | $V_{GS}$=20V, $T_C$=25°C | $I_D$ | 7 | A |
| | $V_{GS}$=20V, $T_C$=100°C | | 4.5 | A |
| Power Dissipation | | $P_D$ | 62 | W |
| Thermal Resistance, Junction to Case | | $R_{\theta JC}$ | 1.8 | °C / W |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 150 | °C |

## DIMENSIONS

| DIMENSION | Min | Max |
|---|---|---|
| A | 4.80 | 5.20 |
| A1 | 2.21 | 2.59 |
| A2 | 1.85 | 2.15 |
| b | 1.11 | 1.36 |
| b1 | 2.91 | 3.21 |
| b2 | 1.91 | 2.21 |
| c | 0.51 | 0.75 |
| D | 20.70 | 21.30 |
| D1 | 16.25 | 16.85 |
| e | 5.44 BSC | |
| e1 | 5.44 BSC | |
| E | 15.50 | 16.10 |
| L | 19.62 | 20.22 |
| L1 | -- | 4.30 |
| p | 3.40 | 3.80 |
| p1 | -- | 7.30 |
| Q | 6.15 BSC | |

Note: Pin Layout: 1:Gate(G), 2:Drain(D), 3:Source(S)

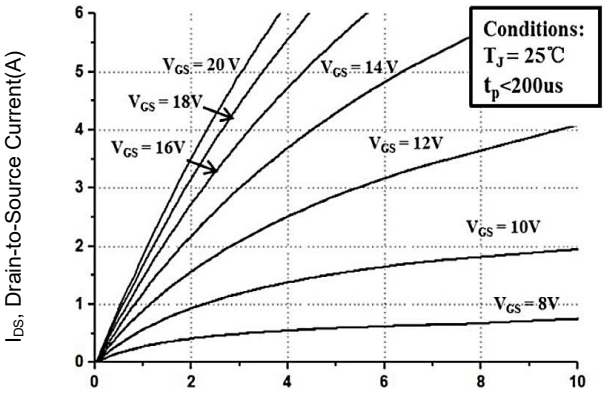


## ELECTRICAL CHARACTERISTICS

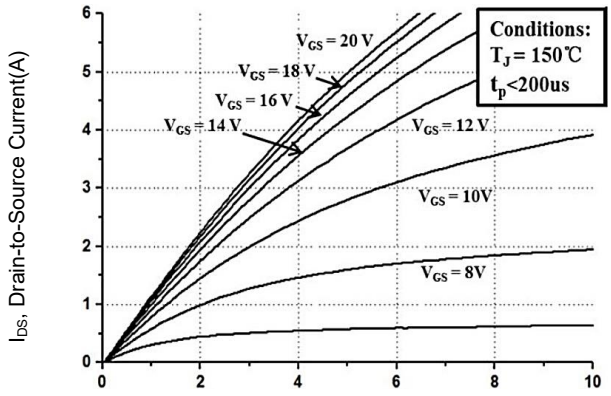
| Off Characteristics | Conditions | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=100μA | $BV_{DSS}$ | 1700 | -- | -- | V |
| Zero Gate Voltage Drain Current | $V_{DS}$=1700V, $V_{GS}$=0V | $I_{DSS}$ | -- | 1 | 100 | μA |
| Gate-Body Leakage Current, Forward | $V_{GS}$=25V, $V_{DS}$=0V | $I_{GSSF}$ | -- | 10 | 250 | nA |
| Gate-Body Leakage Current, Reverse | $V_{GS}$=-10V, $V_{DS}$=0V | $I_{GSSR}$ | -- | 10 | 250 | nA |
| **On Characteristics** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Static Drain-Source On-Resistance | $V_{GS}$=20V, $I_D$=2A | $R_{DS(ON)}$ | -- | 650 | 850 | mΩ |
| | $V_{GS}$=20V, $I_D$=2A, $T_J$=150°C | | -- | 950 | -- | |
| Gate Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=1mA | $V_{GS(th)}$ | 2.0 | 2.6 | 4.0 | V |
| | $V_{GS}$=$V_{DS}$, $I_D$=1mA, $T_J$=150°C | | -- | 1.8 | -- | |
| **Dynamic Characteristics** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Total Gate Charge | $V_{DS}$=1200V, $I_D$=2A, $V_{GS}$= -5/+20V | $Q_g$ | -- | 23 | -- | nC |
| Gate-Source Charge | | $Q_{gs}$ | -- | 5.4 | -- | |
| Gate-Drain Charge | | $Q_{gd}$ | -- | 7.6 | -- | |
| Turn-On Delay Time | $V_{DS}$=1200V, $I_D$=2A, $R_L$=20Ω<br>$V_{GS}$= -5/+20V, $R_{GEN}$=2.5Ω, | $T_{d(on)}$ | -- | 13.8 | -- | nS |
| Rise Time | | $T_r$ | -- | 22.8 | -- | |
| Turn-Off Delay Time | | $T_{d(off)}$ | -- | 38 | -- | |
| Fall Time | | $T_f$ | -- | 14 | -- | |
| Turn-On Switching Loss | $V_{DS}$=1200V, $I_D$=2A, L=1500μH<br>$V_{GS}$= -5/+20V, $R_{GEN}$=2.5Ω, | $E_{ON}$ | -- | 5 | -- | mJ |
| Turn-Off Switching Loss | | $E_{OFF}$ | -- | 9.2 | -- | |
| Input Capacitance | $V_{DS}$=1000V, $V_{GS}$=0V, $V_{AC}$=25mV<br>f=1MHz | $C_{iss}$ | -- | 198 | -- | pF |
| Output Capacitance | | $C_{oss}$ | -- | 13 | -- | |
| Reverse Transfer Capacitance | | $C_{rss}$ | -- | 2.1 | -- | |
| **Drain-Source Body Diode** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Diode Forward Current | $T_C$=25°C | $I_S$ | -- | -- | 7 | A |
| Drain-Source Diode Forward Voltage | $V_{GS}$= -5V, $I_{SD}$=3.5A | $V_{SD}$ | -- | 4.2 | -- | V |
| | $V_{GS}$= -5V, $I_{SD}$=3.5A, $T_J$=150°C | | -- | 3.9 | -- | |
| Peak Reverse Recovery Current | $V_R$=1200V, $I_{SD}$=2A | $I_{rm}$ | -- | 2.8 | -- | A |
| Reverse Recovery Time | | $T_{rr}$ | -- | 25 | -- | nS |
| Reverse Recovery Charge | | $Q_{rr}$ | -- | 15 | -- | nC |

## CHARACTERISTIC CURVES

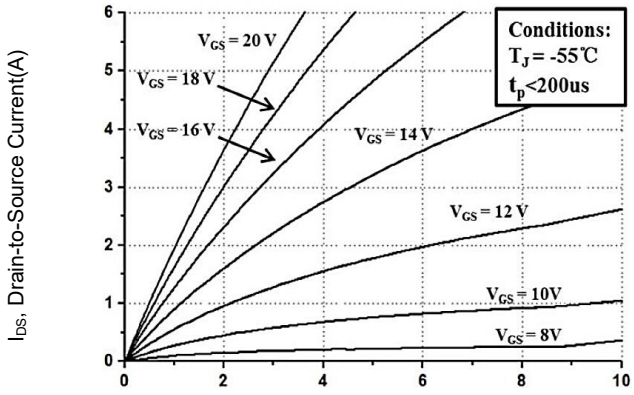
**Output Characteristics**



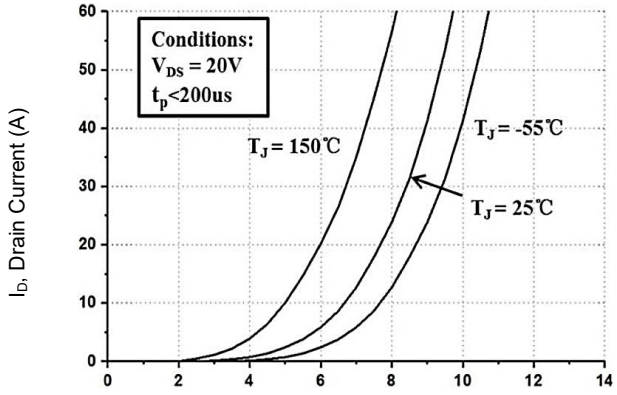

**Output Characteristics**



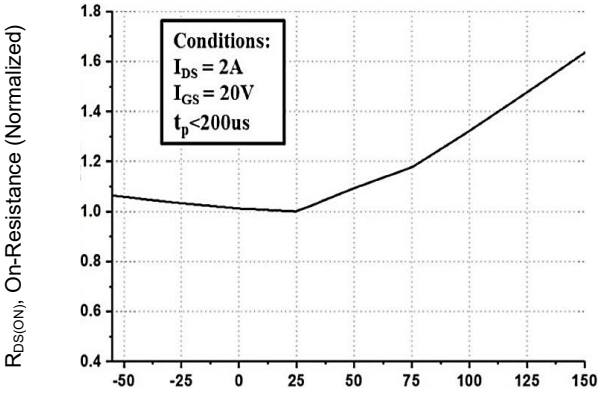

**Output Characteristics**



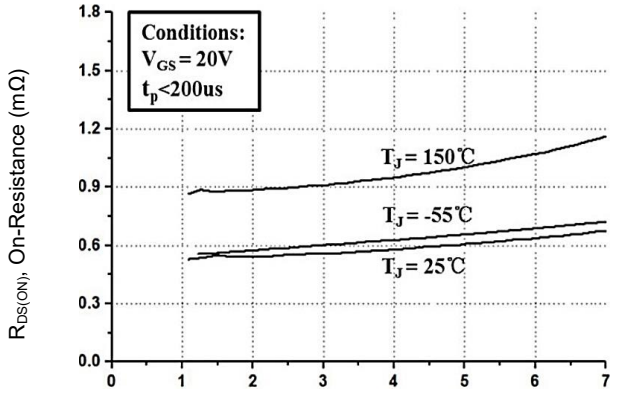

**Transfer Characteristic**




**Normalized On-Resistance vs. Junction temperature**

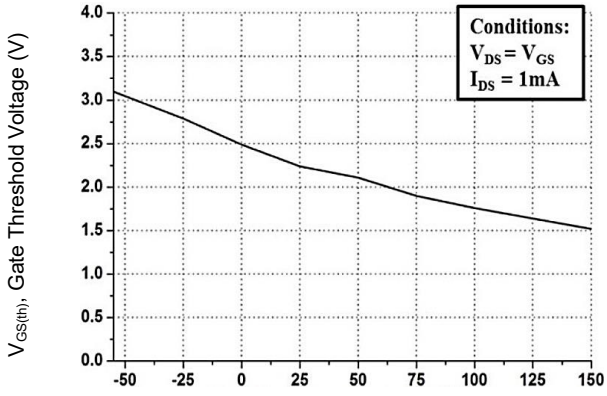



**On-Resistance vs. Drain Current**



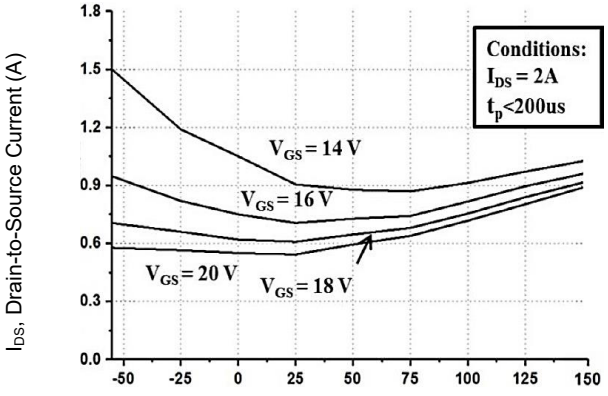
## CHARACTERISTIC CURVES

**Threshold Voltage vs. Junction temperature**



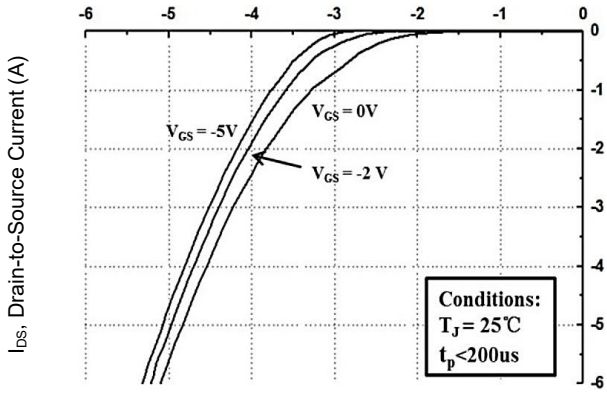

$V_{DS}$, Drain-to-Source Voltage (V)

**On-Resistance vs. Junction temperature for $V_{GS}$**



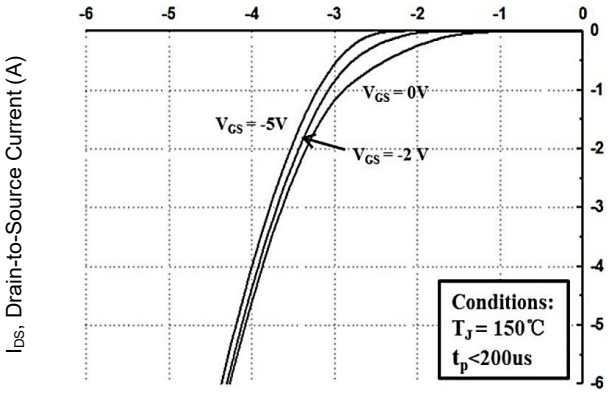

$V_{DS}$, Drain -to- Source Voltage (V)

**Body Diode Characteristics**



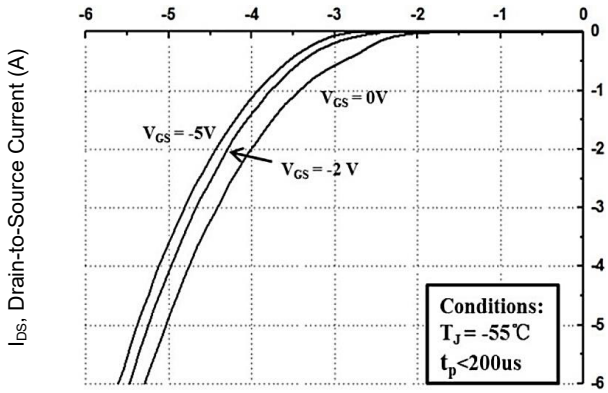

$V_{DS}$, Drain -to- Source Voltage (V)

**Body Diode Characteristics**



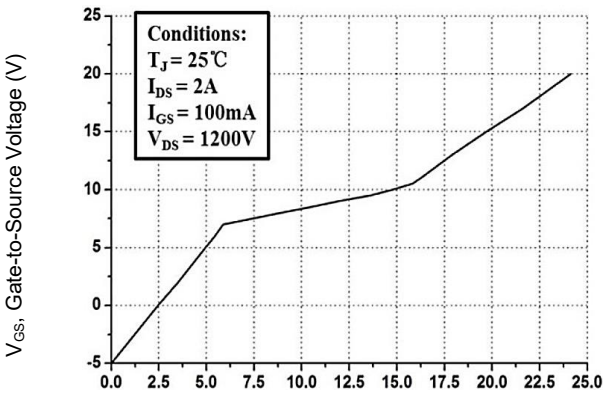

$V_{DS}$, Drain -to- Source Voltage (V)

**Body Diode Characteristics**




$V_{DS}$, Drain -to- Source Voltage (V)

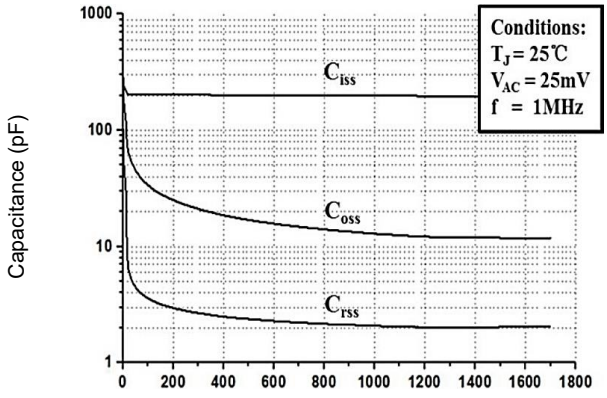
**Gate-Charge Characteristics**




$Q_g$, Gate Charge (nC)

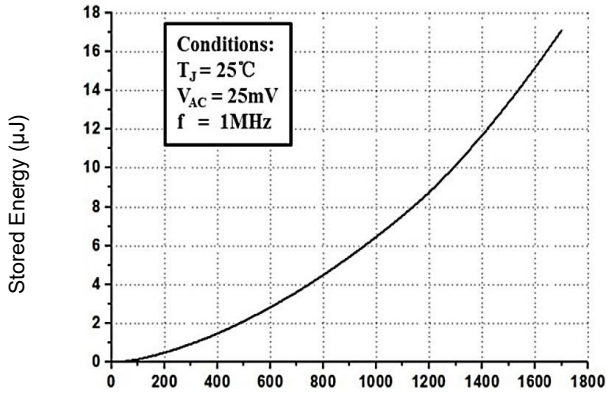
## CHARACTERISTIC CURVES

**Capacitance vs. Drain-Source Voltage**



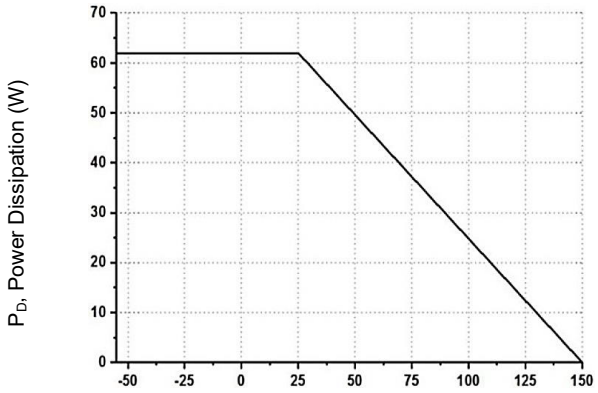

$V_{DS}$, Drain -to- Source Voltage (V)

**Output Capacitor Stored Energy**



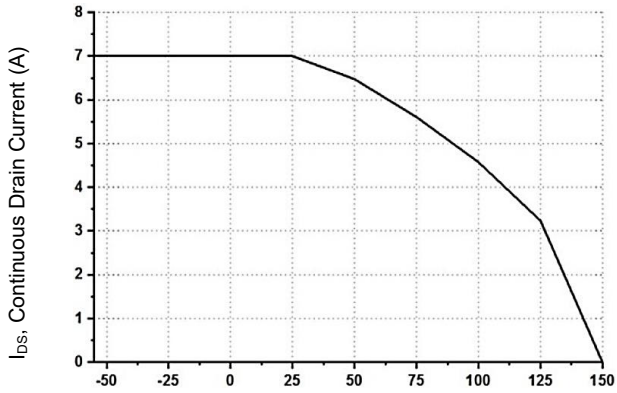

$V_{DS}$, Drain -to- Source Voltage (V)

**Maximum Power Dissipation Derating**



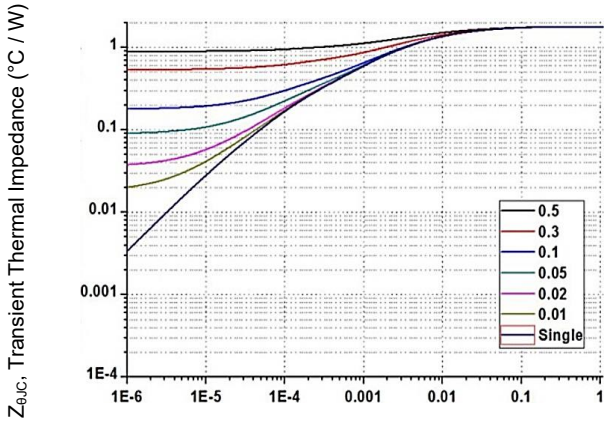

Case Temperature (°C)

**Continuous Drain Current vs. Case Temperature**



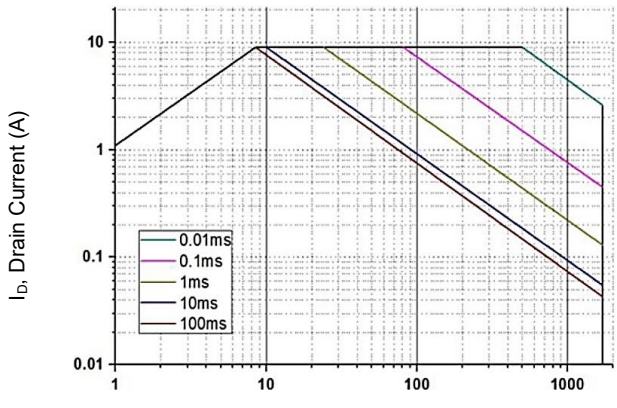

Case Temperature (°C)

**Transient Thermal Impedance**




Pulse Width (S)

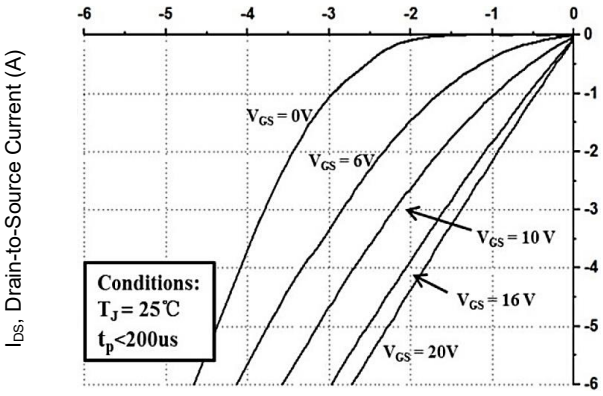
**Safe Operating Area**




$V_{SD}$, Source-to-Drain Voltage (V)

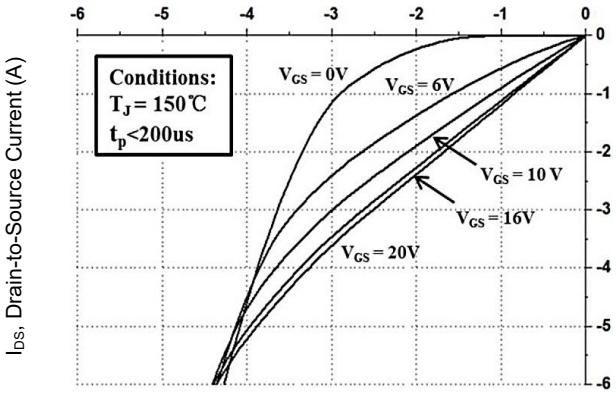
## CHARACTERISTIC CURVES

**3rd Quadrant Characteristics**



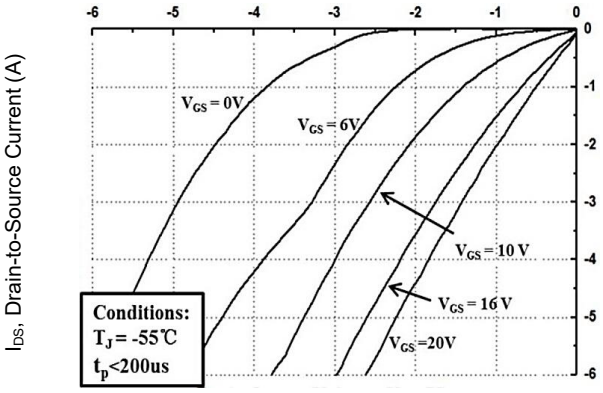

$V_{DS}$, Drain -to- Source Voltage (V)

**3rd Quadrant Characteristics**




$V_{DS}$, Drain -to- Source Voltage (V)

**3rd Quadrant Characteristics**




$V_{DS}$, Drain -to- Source Voltage (V)